Toxicity of Crude Oil and It's Vapors

CRUDE OIL is a complex mixture of chemicals, some volatile and some water soluble. One of the components of crude oil is hydrogen sulfide, a very potent neurotoxin. Although hydrogen sulfide is a gas, it has solubility in water. This characteristic in combination with other sulfides and lower aliphatic and aromatic hydrocarbons, which are part of the crude oil, is what we smell when land and water become contaminated with crude oil. Hundreds of chemicals make up the crude including some straight chained hydrocarbons, branched hydrocarbons, aromatic compounds, and naphthenes, as well as polynuclear aromatic hydrocarbons.

One of the more insidious components of crude oil is benzene. Benzene is quite water soluble (1700 mg/l) and is a known human carcinogen producing various blood dyscrasias including aplastic anemia, Non-Hodgkin's Lymphoma, and leukemia. The toxicology of benzene is addressed in the Toxicology Litigation Support section on this website. One of the potential problems with benzene is that it is more soluble in the crude oil than it is in water. It can be released from the floating crude into the air over the water and also released from the crude on the shore by the baking sun. This presents only one of the potential health hazards for those living near a contaminated shoreline. Similarly, a host of additional low molecular weight hydrocarbons, aromatic compounds, and sulfur compounds can act in a similar fashion.

Also contained in crude oil are several polynuclear aromatic hydrocarbons, many of which are also classified as known human carcinogens. These materials mostly have very limited volatility, but they can penetrate human and animal skin resulting in significant exposure to those contacting the crude oil. They can adhere also to airborne dust particles and be inhaled. These polynuclear aromatic hydrocarbons (PNAs) tend to concentrate in fatty tissue and are slowly released into the body producing a long-term exposure scenario. Animals and aquatic life exposed to crude also would be expected to concentrate these PNAs in fatty tissue which could later be consumed by humans resulting in additional exposure to polynuclear aromatic hydrocarbons. The use of dispersants exacerbates this problem and, in my opinion, significantly increases the toxicity of crude oil and its components to marine life. This could easily be tested using standard toxicological protocols, but, to my knowledge, this has not been done.

Some of the immediate symptoms resulting from exposure to crude oil would include difficulty breathing, nausea, headaches, dizziness in relatively healthy people, but those with conditions such as COPD, allergies, and asthma would be affected even more and their health problems significantly exacerbated. Effects presenting at a later time could result in long-term effects on the respiratory, immune, nervous, and reproductive systems and may even result in birth defects and cancers. Endocrine disruption, DNA damage, damage to the developing fetus, blood disorders, and mutations have all been shown to result from exposure to the components of crude oil.

In conclusion, crude oil is a highly toxic mixture of carcinogens, neurotoxins, respiratory irritants, hepatotoxins, nephrotoxins, and mutagens. Its toxic effects can be

both acute and chronic resulting in a number of immediate symptoms and significant long-term effects including reproductive problems and cancer. Exposure to crude can be through the air as a result of volatilization of some of its components, through direct contact by dermal penetration, and orally through the ingestion of contaminated food.
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